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Note on Silicon in the Chromosphere. By A. Fowler.

Pending a more complete investigation of the spectrum of silicon in relation to the chromosphere and Sun-spots, it may be of interest to draw attention to the identification of two strong red lines of this element with well-marked chromospheric lines. The lines in question have been previously observed in the spark spectrum by Salet (λλ 6341, 6366), by the Count de Gramont (λλ 6342, 6370), and more recently by Lunt, who gives the approximate wave-lengths 6346·9 and 6371·2.*

A careful re-determination of the positions of these lines, from photographs giving a linear dispersion of 10 tenth-metres to the millimetre in this part of the spectrum, leaves no doubt as to their coincidence with the previously unidentified high-level chromospheric lines at 6347·31 and 6371·57. The more refrangible of the two lines is the stronger, in the proportion of about 10 to 6, and their intensities in the chromosphere, according to my own observations,† are 25 and 15 respectively. Both lines occur in the Fraunhofer spectrum, with intensities and characters 2N and 1Nd? respectively, and Rowland assigns the latter to iron, while leaving the other unidentified. Kayser and Runge also give a faint line at 6371·60 in the arc spectrum of iron, but it does not appear on my photographs of the iron spectrum, except when the presence of silicon is indicated by the other line at 6347·31. In any case, if there be an iron line at 6371·57, it is not an enhanced line, and is not of sufficient intensity in the arc to account entirely either for the Fraunhofer or chromospheric line at the same wave-length, which must accordingly be attributed chiefly to silicon.

In Sun-spots, according to the observations of Mitchell‡ and myself, the two lines are almost obliterated, so that there is a complete agreement of behaviour and intensities throughout.

The relationships of the different families of silicon lines have not yet been fully worked out, but it is probable that the two red lines, like so many of the other high-level chromospheric lines which are weakened in spots, belong to the enhanced line class. Like the enhanced lines of iron, they appear close to the positive pole when a little silica is introduced into the iron arc, and the wave-lengths have been determined by reference to adjacent iron lines which occur with the silicon lines under these conditions. In his recent discussion of the violet part of the flash spectrum Prof. Dyson§ concluded that there was "a fair degree of probability for the existence of silicon in the chromosphere," and all doubt is now removed by the identification of the red lines.

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* *Annals of the Cape Observatory*, vol. x., Part II., p. 18B (1906).

† *Monthly Notices*, vol. lxvi. p. 365 (1906).

‡ *Astrophys. Jour.*, vol. xxiv. p. 92 (1906).

§ *Phil. Trans.*, vol. ccvi. A, p. 440 (1906).

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Notes on some Spectroscopic Observations of the Sun.
By H. F. Newall, M.A., F.R.S.

Spectroscopic observations of the Sun have been carried on during the past year at Cambridge. In the earlier part of the year the observations were made with the 25-inch equatorial (the Newall telescope), to which a diffraction-grating spectroscope was attached. In the later months a fixed horizontal telescope was improvised, light being directed into it by means of a cœlostat and an auxiliary mirror; and a much more powerful grating spectroscope was used. It will be convenient to refer to these two equipments as the equatorial and the horizontal.

The general programme was to test by preliminary observations, whether the conditions of atmosphere over the flat plains of Cambridgeshire would justify a special outfit which should enable us to take some active part in solar work. It seemed that the study of sun-spot spectra would be a fitting one for making the trials. For, in this work, not only is a fairly clear atmosphere desirable, such as will not prevent the detection of faint characteristic detail in the sun-spot spectra by the overpowering effect of integrated sunlight scattered by intervening haze; but also a steady atmosphere is needed, such as will not give rise to jumping images and the blurring effects due to the spread of circumpenumbral light over the umbra in consequence of atmospheric tremor.

Accordingly a programme was adopted to include spectroscopic observations of sun-spots and other details on the solar surface, but not observations of prominences at the limb.

My idea was that it would be best, in the first instance, to utilise the equatorial equipment to gain practical ideas of the difficulties to be met, and the advantages to be gained, in direct pointing at the Sun with a telescope whose object-glass would in general be about 30 feet above the ground. And then, if the observations proved to be generally encouraging as regards atmospheric conditions, a horizontal equipment was to be tried, with the beam about 6 feet above the ground.

The result of these trials has been completely satisfactory and decisive. The observations with the equatorial equipment showed that good conditions of observing were available in the early morning between 6 and 9 A.M.

The observations with the horizontal equipment showed that these conditions are not seriously impaired by bringing the beam nearer to the ground; any deterioration arising from greater proximity to the ground is probably more than balanced by the vastly freer circulation of air in the path of the optical beam in the open dome as opposed to the closed tube of the equatorial. The conveniences of working with the horizontal equipment—on a fixed floor, with fixed apparatus, with eye-piece in constant and convenient position, with all the parts easily accessible, and most of

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